CLAIMS

1. An optical device for routing a plurality of optical signals between a first port and a second port in response to a control signal, the optical device comprising:

at least one mirror array having a plurality of reflective elements, at least one optical signal of the plurality being reflected from the first port by a first reflective element of the plurality in a direction designated by the control signal; and

at least one optical component for receiving the at least one reflected optical signal from the respective reflective element, and for directing the at least one reflected optical signal to at least one of the fist and second port by a supplemental reflective element, the optical component being spaced from the at least one mirror array by a distance greater than a Rayleigh range without scattering the at least one optical signal.

2. The optical device of Claim **1**, wherein the at least one optical component comprises a curved mirror.

3. The optical device of Claim **2**, wherein the at least one mirror array comprises:

a first mirror array; and

a second mirror array coupled with the first mirror array, wherein the first reflective element of the first mirror array, in response to the control signal, redirects the at least one optical signal to the supplemental reflective element of the second mirror array.

4. The optical device of Claim **3**, wherein the supplemental reflective element is formed on the second mirror array, and in response to the control

signal, reflects the redirected at least one optical signal to at least one of the first and second port.

5. The optical device of Claim 3, wherein the first mirror array and the second mirror array are formed on a common substrate.

6. The optical device of Claim 3, wherein the at least one mirror array comprises a MEMS mirror array.

7. The optical device of Claim 3, wherein the at least one optical component comprises:

a bi-convex lens;

a patterned mirror embedded within the bi-convex lens, the patterned mirror having reflecting and non-reflective portions, wherein

a second optical signal of the plurality, in response to the control signal, is directed by a second reflective element of the first mirror array to one reflecting portion of the patterned mirror, the one reflecting portion reflecting the second optical signal to at least one of the first and second ports; and

a third optical signal of the plurality, in response to the control signal, is directed by a third reflective element of the first mirror array through one non-reflecting portion of the patterned mirror and to a fourth reflective element of the second mirror array, the fourth reflective element directing the third optical input signal to at least one of the first and second ports.

8. The optical device of Claim 7, wherein:

a fourth optical signal of the plurality, in response to the control signal, is directed by a fifth reflective element of the second mirror array to another

reflecting portion of the patterned mirror, the another reflecting portion of the patterned mirror reflecting the fourth optical signal to at least one of the first and second ports; and

a fifth optical signal of the plurality, in response to the control signal, is directed by a sixth reflective element of the second mirror array through another non-reflecting portion of the patterned mirror to a seventh reflective element of the first mirror array, the seventh reflective element directing the reflected fifth optical signal to at least one of the first and second ports.

9. The switch of Claim 9, wherein at least one reflective element of the plurality has range equal to the sum of an incoming angle and an outgoing angle, where

the incoming angle is equal to the inverse tangent of a length of the at least one MEMS mirror array divided by twice the sum of a displacement distance formed by the curved mirror and a Rayleigh range; and

the outgoing angle is equal to the inverse tangent of the length of the at least one mirror array divided by twice the difference between the radius, the Rayleigh range and the displacement distance.

10. An optical device for routing a plurality of optical signals between a first port and a second port in response to a control signal, the optical device comprising:

at least one curved mirror; and

at least one MEMS mirror array having a plurality of mirror elements, wherein

a first mirror element of the plurality, in response to the control signal, for reflecting a first optical signal of the plurality from at

least one of the first and second ports to the at least one curved mirror;

the at least one curved mirror reflecting the first optical signal from the first mirror element to a second mirror element of the plurality; and

the second mirror element of the plurality, in response to the control signal, for reflecting the reflected first optical signal from the second mirror to at least one of the first and second ports, such that the second mirror element is spaced from the at least one curved mirror by a distance greater than a Rayleigh range without scattering the reflected first optical signal.

11. The switch of Claim **10**, wherein the at least one MEMS mirror array comprises:

a first MEMS mirror array; and

a second MEMS mirror array optically coupled with the first MEMS mirror array, wherein

a third mirror element of the first MEMS mirror array, in response to the control signal, reflects a second optical signal of the plurality from at least one of the first and second ports; and

a fourth mirror element of the second MEMS mirror array, in response to the control signal, reflects the second optical signal reflected by the third mirror element to at least one of the first and second ports.

12. The switch of Claim **11**, wherein the first MEMS mirror array and the second MEMS mirror array are formed on a common substrate.

13. The switch of Claim **11**, wherein the at least one curved mirror comprises:

a bi-convex lens;

a patterned mirror embedded within the bi-convex lens, wherein

a third optical signal of the plurality is reflected from a fifth mirror element of the first MEMS mirror array to the patterned mirror, the third optical signal being reflected from the patterned mirror to at least one of the first and second ports;

a fourth optical signal of the plurality is reflected from a sixth mirror element of the second MEMS mirror array to the patterned mirror, the fourth optical signal being reflected from the patterned mirror to at least one of the first and second ports; and

a fifth optical signal of the plurality is reflected from a seventh mirror element of the first MEMS mirror array through the patterned mirror and to an eighth mirror element of the second MEMS mirror array, the eighth mirror element reflecting the reflected fifth optical signal to at least one of the first and second ports.

14. The switch of Claim **13**, wherein a sixth optical signal of the plurality is reflected from a ninth mirror element of the second MEMS mirror array through the patterned mirror and to a tenth mirror element of the first MEMS mirror array, the tenth mirror element reflecting the reflected sixth optical signal to at least one of the first and second ports.

15. The switch of Claim **10**, wherein at least one mirror element of the plurality has range equal to the sum of an incoming angle and an outgoing angle, where

the incoming angle is equal to the inverse tangent of a length of the at least one MEMS mirror array divided by twice the sum of a displacement distance formed by the curved mirror and a Rayleigh range; and

the outgoing angle is equal to the inverse tangent of the length of the at least one mirror array divided by twice the difference between the radius, the Rayleigh range and the displacement distance.